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Attenuating phase shift photomasks

Description of Technology: This invention relates to phase shift photomasks for use in photolithography with short wavelength (i.e., <400 nm) light. More specifically this invention relates to phase shift photomasks that attenuate and change the phase of transmitted light by 180.degree..+-.10.degree., and odd multiples thereof, relative to light propagating the same path length in air. Such photomasks are commonly known in the art as attenuating (embedded) phase shift photomasks or half-tone phase shift photomasks

Patent Listing:

1. **US Patent No. 6,174,631**, Issued January 16, 2001, "Attenuating phase shift photomasks" http://patft.uspto.gov/netacgi/nph-Parser?Sect2=PTO1&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&d=PALL&RefSrch=yes&Query=PN%2F6174631

Market Potential: Conventional photomasks commonly consist of a substrate, e.g., fused silica plate, having an opaque chrome film. Photomasks are produced from these blanks by providing a desired pattern of open areas in the film. In use, light is optically projected through the open areas of the photomask onto the surface of a light sensitive substrate, such as a photoresist or photopolymer-coated semiconductor wafer. Currently, photomasks are illuminated with visible or ultraviolet light. A fundamental limitation of optical imaging is that line widths of the order of the wavelength of the illuminating light are diffraction limited. In other words, light having a wavelength of the same order of magnitude as the desired optical image will be diffracted, and the projected image will be wider than the desired image.

Benefits:

- A phase shift photomask enhances the patterned contrast of small circuit features by destructive optical interference of the light projected through the open areas in the film with light projected through the film on the substrate.

Applications:

- Photomasks for use in photolithography with short wavelength light

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